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THE MANUFACTURE OF COPRA.

METHODS AND DRYING HOUSES.

Translated from the German for the "Tropical Agriculturist" by J. J. Dennehy, Esq.

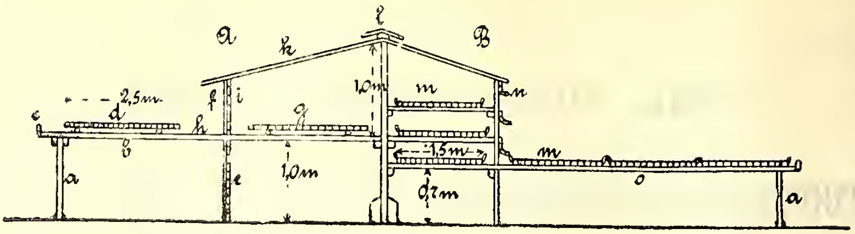
The kernel of the coconut is converted into copra by being dried in the sun or in artificial heat. The manufacture of copra by drying the kernel in the sun is the most primitive method of treatment, although good results can in this way be achieved in a strong sun and by the application of sufficient care. The season of the year has of course a very important bearing on the quality of copra and satisfactory results can be achieved only in the hottest and driest months. In countries where the rainfall is almost evenly distributed all the year round the sun-drying process is necessarily attended with serious difficulties.

Under normal weather-conditions, in the absence of rain and dense clouds, the drying process lasts some four or five days, provided, of course, that only fully ripe nuts are manufactured as they contain less moisture in the kernel than unripe ones. The longer the process of drying lasts and the more difficult it is to get rid of the moisture, the greater is the danger arising from the formation of mildew and from the consequent depreciation in the value of the copra. The total evaporation of the water existing in the kernel never takes place and 9 per cent of moisture is generally to be reckoned with. This moisture is always conducive to the formation of mildew in the copra when left exposed for a long period in places having a normal temperature.

In the method under treatment the nuts are, to begin with, placed in the sun in single layers, immediately after being opened. Special emphasis must be laid upon the necessity for drying the nuts in single layers only. Attention, too, must be paid to removing fully all milk. As the nuts on being spread out to dry after being opened are still contained in the fragments of the inner shell, moisture may easily collect in the bottom of the fragments. Unless this be removed the drying process is delayed and there is formed a glutinous sticky substance which settles in the bottom of the nut, serves as a receptacle for dirt and thereby brings about a deterioration in the quality of the copra.

As it is most important to hasten on the process of drying as much as possible and to do the utmost to get the surface of the kernel dried on the first day, no nut should be opened after 11 a.m. The kernel should be most carefully protected against rain and dew both during and after the process of drying. Every drop of water that falls on the surface of the kernel has a prejudicial effect on the uniform colour of the copra even when it does not lead to the formation of mildew. When the moisture on the surface of the nut has evaporated and when the latter becomes so dry that extraueous bodies cannot easily cling thereto, the kernels are removed from their husks. Here again all contact with dirt must be carefully avoided. In New Guinea the contents of the shell are removed immediately after opening the nut. As, however, at this particular juncture the kernel still clings fast to the shell, the resultant cutting away and forcing of the copra therefrom with a blunt knife require a greater expenditure ot time than when the copra is removed immediately after drying the surface.

To be dried in the most advantageous way the spliced nuts are placed on wire trays arranged somewhat as follows :—



a Props for the floor under the drying-trays which move on rollers.
b A sort of wooden rail for the rollers to move on.
c Wooden stay to protect the tray from falling down.
d Drying trays.
e Boarding covering the house-props.
f House props.
g Shelter which houses the trays (d) at night or during rain (Sliding roof for covering as) security against rain when trays are being housed.
k l. Corrugated iron roof.
m Portable trays for use (at night).
n The outer wall with a kind of portcullis-like doors.
o Position of the trays by day.

The sketch (A) shows a shed some 2 metres high, roofed with corrugated iron, for sun-drying copra. It serves as a shelter for trays, about 2 m × 2·5 m in size, which stand near each other and on rollers for facility of movement.

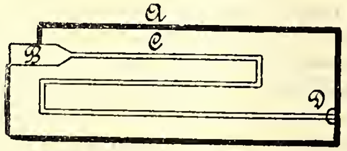
The sketch B shows an arrangement of smaller trays one over the other for use at night. Both arrangements have turned out successful in practice. The planning and up-keep of this kind of drying-shed may be carried out without great expense and the drying of the copra under shelter of the roof is a great improvement on the extremely primitive method of doing so on the bare ground or on sand, as in this latter case the absolutely requisite protection against rain and dew cannot be provided for.

The planter who would make the yield of his copra independent of the weather and put a uniformly good ware on the market must, however, make up his mind to construct sheds in which the process of drying is done by artificial heat.

The principle of this species of drying-shed consists of heating iron pipes and of having the copra dried by placing it on trays over these pipes in the sheds. The methods of generating the heat are different. Subjoined I give a short sketch of this arrangement.

"Der Tropenpflanzer,*" on a request made to the "German Commercial and Planting Company of the South Sea Islands," received the following information *re* drying-kilns:--

The Manufacture of drying-kilns is not known to us. In our plantations in Samoa we at first used California fruit-drying kilns for our copra which besides being very costly were very combustible so that several of them were totally destroyed by fire. Again they did not produce a good white copra as they had to be heated too much to effect the drying at all and when the ventilation was increased the process was too slow. After numerous experiments and consultation with a number of engineers we at last developed for our purpose a primitive system of malt-kilns such as an Engineer had previously used in the interior of Russia and we achieved good results therewith. These kilns are set up on our plantations by ourselves.



A Stone substructure.
B Fuel.
C Position of Pipes.
D Chimney.

Heat from a fire is sent through an iron pipe which running backwards and forwards ends in a chimney. These conducting pipes are surrounded by masonry on which higher up are wooden walls. The room is divided sometimes into two, sometimes into three compartments into which the trays are pushed with the copra to be dried, 15 or 16 pieces one over the other.

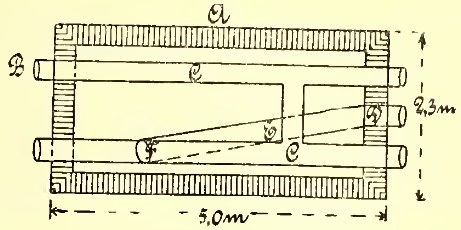
The whole contrivance is roofed over and provided with means of ventilation to carry off the moisture-saturated air. Ventilators for the introduction of air must be placed under the pipes also to ensure a good circulation and there must not be too much heat. We have discovered that at a temperature of 40° to 45° C. in the drying-room and with a good circulation of air the copra is of the best white and dries well."

Professor Preuss* describes as follows the latest kind of drying sheds in Samoa which are good and workable :—"The kilns consist of a stone sub-

* 1904, No. 6.

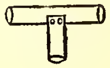
* "Der Tropenpflanzer" 1907 No. 1.

structure 5 meters long, 2·3 meters wide and 2·3 m. high and a wooden superstructure. The lower part is the heating-room. The fire lies heaped up near one of the shorter sides. The fire-grate slopes somewhat from front to back. The heat goes off into a masonry canal which runs obliquely along the floor to the centre of the room to about ¾ of the latter's length. Where the canal ends it is connected with a vertical pipe of the shape given below, so long that its top lies some 70 cm above the floor of the heating-room.



VIEW OF HEATING-ROOM LOOKING DOWNWARDS.

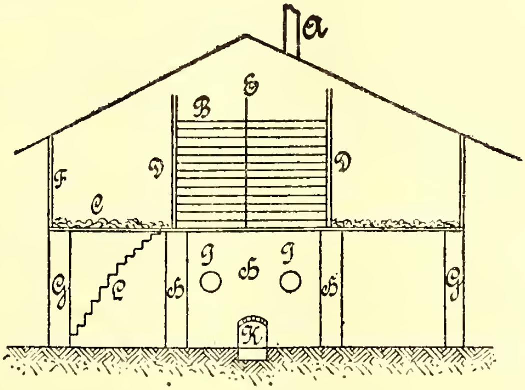
A Masonry
B Chimney.
C Heating-pipes.
D Flue.
E Heat-Canal and Masonry,
F Passage of hot air from canal into pipes.



Connection between Heat-canal and Heating-pipe.

This short connecting tube runs into the system-proper of horizontal pipes. This latter consists of two pipes which run parallel to the longer walls, have a diameter of about 30 cm. and are connected by a transverse pipe. The hot air ascends from the masonry canal, rising vertically, into the long-pipe, passes through this and the connecting tube into the second long-pipe and through this again into the chimney which is 12 meters high.

The three other ends of the pipes open outwards through the walls, are generally stopped with clay and are opened only for the purpose of being cleaned. Sometimes there are three pipes especially when there are three compartments with trays above. The pipe system lies about 1·3 m. under the upper ledge of the walled room.



A Chimney,
B Copra-trays (18 one above the other.)
C Wooden floor of the upper story with copra thereon.
D Wooden chamber for the trays.
E Partition wall.
F Outer walls of the superstructure (Boards).
G Masonry supports of the superstructure.
H Stone substructure of the heating-room.
J Ends of the heating-pipes.
K Furnace.
L Stairs leading to upper part.

The heating-room is covered with iron bars over which is laid wire-netting which thus become the floor of the drying-house. This room for the trays whose ground-plan is a little larger than the heating-room is so high that about 18 trays can stand over one another. It is a big box with wooden walls which has ventilation holes opening upwards. Inside it is divided by walls into two or three compartments into which the trays just manage to pass. The latter are about 1 m. long and 50 cm. wide. On one side of the box there are as many doors as compartments. Fresh copra is every morning spread out on the trays which are then pushed into the

compartments. They are so close-fitting that they just manage to pass in and stand in several rows one above the other. In Vaitelu the kiln has 200 trays each with 6 lb. of copra; in Vaivase the trays stand in 4 compartments each of the latter with seven trays on its floor and thirteen one over the other. In Apia the kiln has only two compartments each with 9 trays on its floor 18 one over the other. As soon as the compartments are filled with trays the doors are closed and drying begins. The hot air rushes from the heating-room through the wire-netting and through all the trays and goes out through an opening above. Fresh air enters the heating-room generally through several small openings in the masonry of the same and so at very little distance above the ground. In the latest type of kiln the air enters by a shallow canal built on to the heat-canal and running over it. In this there are several openings for the air to escape. The fresh air enters this canal through an opening above the fire. Here it is immediately heated and straight away enters the heating-room. Every such kiln dries about 1,700 lb. copra in twenty four hours and so 25 tons per month. The heat is about 50deg. C. Near the kiln-proper there is on three sides a wooden floor which is reached by a stair-way. On this floor is spread out the hot copra just taken from the kiln to be cooled, and at the same time to give off any moisture remaining. If the copra is not spread out to be gradually dried and cooled and if it is not at the same time well turned up by the shovel, it grows mouldy. When this process is carefully followed the copra is beautifully white and pays much better than the South Seas article.

The cost of a kiln runs to about 6,000 or 7,000 marks. It may here be remarked that the material for the piping can be obtained in sheets which may be cut and rivetted in Samoa itself. The kilns which have been described suffer from two disadvantages. They exclude the co-operation of the sun in drying and do not allow of the copra being turned in the trays except in very limited quantities. It must nevertheless be admitted that they serve their purpose splendidly and in a comparatively small space, at little cost and with the service of only a few hands yield a maximum of work.

On the Arle estate a kiln has been built with hot-water apparatus but its working is very defective. Coconut shells are used as fuel and these burn so quickly underneath that their heat is not sufficient. Besides the pipes in which the hot-water circulates are so thickly covered in a short time with the soot given off by the shells that the flames cannot come into direct contact with the pipes."

The following sketches give an idea of the construction of drying-houses for copra in German New Guinea. As is evident from the drawing, the principle is really the same as that of the Samoan drying-sheds described by Professor Preuss except that in those built in 1908 the following improvements have been introduced :—

1. Increase of heating power in the shed by doubling the number of pipes in which the hot air need travel but a little distance and so loses less of its heating-power.

2. The avoidance as much as possible in the pipes of angles which favour the collection of soot.

3. Making it feasible to turn over the copra in the hurdles. (Model II).

4. The co-operation of the sun for drying by day, the influence of artificial heat in rainy weather and at night. (Model II).

5. Increased draught by having the heating flues at an incline.

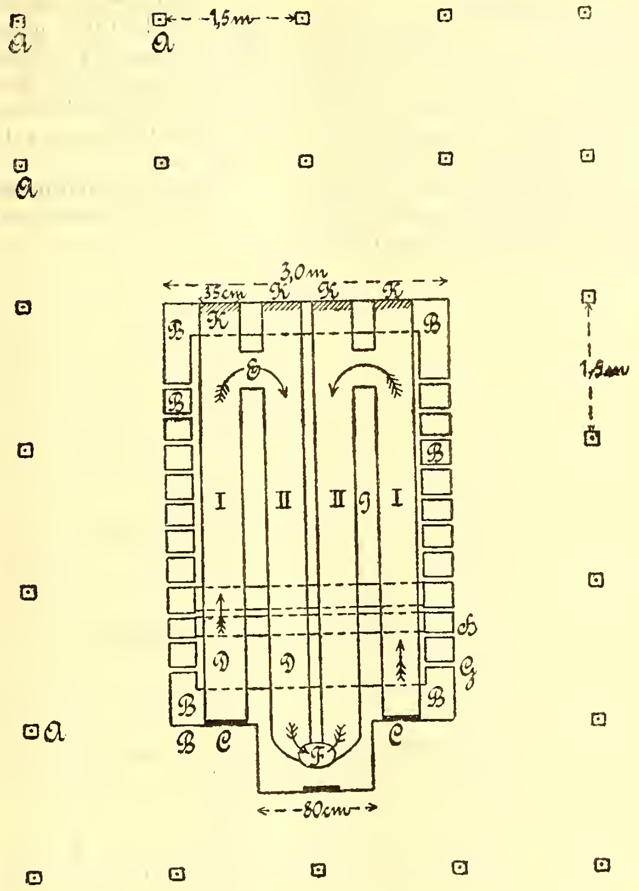
6. The possibility of having only half the shed working when under repair or when there is not copra enough to keep all the chambers going.

7. By division into separate chambers obtaining the full benefit of the heat which is generated which easily reaches all the trays.

8. Few attendants : two men.

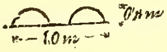
9. The disadvantage of such a drying-shed (Model I) lies in the fact that there is no simultaneous drying of the copra thus spread out in a mass, whereas the copra lower down dries more quickly than that in the upper trays and whereas also the removal of the dried copra at the proper time demands earnest and careful work and attention.

At a temperature of 50C. the drying process occupies 1 to 2 days according to the amount of moisture contained in the copra. The cost of erecting the kiln amounts to about 6,000 marks.

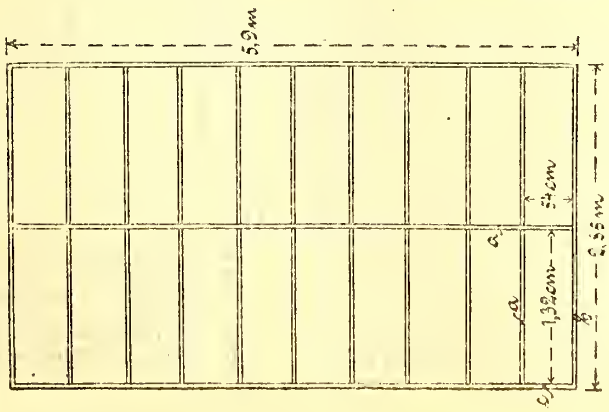


Plan of the sub-structure of a Drying-Shed in German New Guinea. Model I.

A Cement pillars with wooden joists for the superstructure.
B Substructure of masonry for the heating-system.
C Fire.
D Heating-pipes, 35 c.m. diameter I rises in the direction of the arrow to a distance of from 70 c.m. to 1 m.: II from 1 m. to 1 m. 10.
E Connecting-pipe.
F Chimney pipe 45 c.m. in diameter in masonry substructure 16 m, high.
G Tin air-pipes.
H Two openings in wall, running through and through, under the heating-pipes.



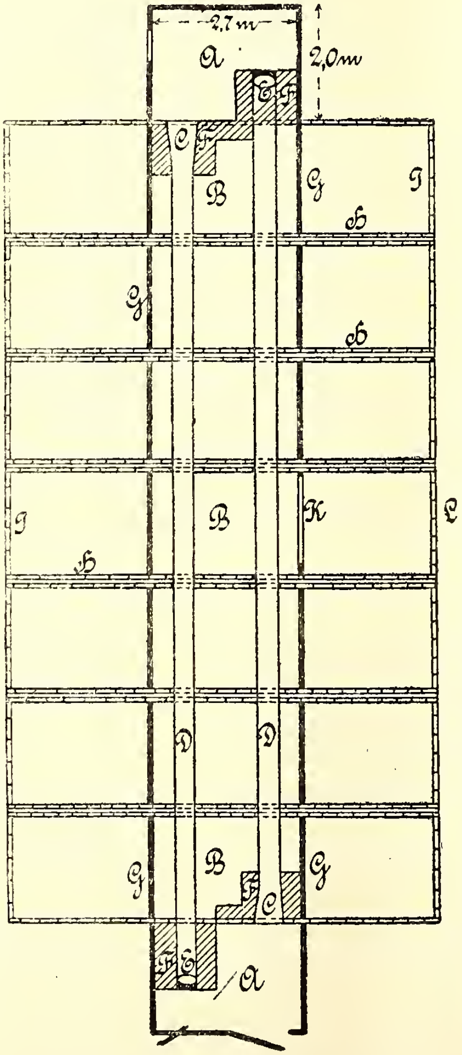
J Free space between heating-pipes.
K Walled-up end of the pipes.



HEATING-ROOM OF SUPERSTRUCTURE (LOOKING UPWARDS.)

Explanation:—The drying room is surrounded by a floor corresponding in size to the sub-structure and lies at an average distance of 1 metre over the pipes. Each side is divided into 10 single chambers each 1·32 m. by 0·54 m. In each of these chambers can be placed, one over the other, as many as 13 trays with bottoms of wire-netting. The chambers have no bottom and the trays are prevented from falling into the heating-room by supports running equilaterally right round the sides (a). The door C which can be lifted off and is held in position above and below by wooden fasteners constitutes the outside end of the chamber. From the door upwards the structure is boarded, the boards as well as the interior wall B reaching 4 metres to the roof.

The drying chamber itself is covered in above by perforated boards running parallel to the trays.



Model II.

A Heat Room.
B Drying Room.
C Furnace.
D Pipe.
E Chimney.
F Part of Heating pipe built round Masonry part of flues.

G Wooden wall protecting shed.
H Sliding-ledges for hurdle.
J End-ledges of sliding-ledges 1·45 m. above the ground.
K Door in the Heat-pipe room generally closed.
L End-ledges of sliding-ledges 1 m. above the ground

The plan reproduced on p. 406 (Model II) shows us a drying-shed (with a different system of pipes and trays) in New Guinea which can be set up at small cost but whose method of operation is exactly similar to the one described above.

To ensure the production of a copra which is proof against mildew it is absolutely necessary to reduce the moisture contained therein to 5 per cent and less—a result which can be achieved only if artificial heat be employed in the process of drying. The quality of the copra is also improved by the increased heat, while the percentage of free fatty acid diminishes; and the oil produced from this copra is less exposed to the danger of becoming rancid.

According to the "Philippine Journal of Science" the free fatty acid after drying the copra amounts:—

In 51—56°C within 20 hrs. to ·08% *
In 50—56°C within 9½ to 14½ hrs. to ·13—·32% †
In 74—93°C within 3½ hrs. to ·06%

The oil extracted from the copra contains free fatty acid as follows, according to experiments made in Manila:—

Method of Preparation	Free Fatty Acid.
Copra dried in Vacuum (100° C)	·06 o/o
Copra dried in sheds (80—90° C)	·06 o/o
Sun dried Copra	·13—3 o/o
Copra Mildewed	1·18—3·5 o/o

The slightly enhanced cost of the manufacture of the copra by artificial drying is made up for by the enhanced price obtained for the better quality. L. Hahn-Heilbroun gives in the form of an extract his opinion of the value of the different processes of manufacture:—"Fire dried copra is useless for food preparations: for oil-food and confectionery fat only sun-dried or artificially dried copra need be taken into consideration.

To the more unimportant kinds belongs Java copra; of still less consequence is the South sea article. Both yield a yellowish oil which contains an unusually large amount of fatty acid. New Guinea copra yields a clear oil with considerably less fatty acid, but cannot attain to the quality of Ceylon copra which produces an oil almost as clear as water and is generally manufactured in a uniform way. The best, however, is Malabar copra which is quite white, without spot or mould of any kind, producing an oil clear as water, with a delicate flavour, and absolutely without serbacic acid—qualities which all find great favour among the manufacturers of palm butter.

Copra sliced into small pieces is less in demand than copra in large pieces as the material is examined before manufacture and the pieces of inferior quality sorted out—a thing which admit of being more easily done in the case of large than of small pieces."—*Die Kultur der Kokospalme von Hans Zaepernick.*

* Drying the nut immediately after opening.

† Drying the nut after having lain for a night open in a room at 30°C.

A NEARLY SEEDLESS MANGO.

The following account of an almost seedless mango that has been given the name Oahu is contained in the annual Report of the Hawaii Agricultural Experiment Station for 1911, issued in April last:—A seedling tree about six or seven years of age bore fruit this year, and its characteristics have given justification for naming it Oahu. It is probably a cross between the Hawaiian sweet mango and the Crescent. Although the husk is present, the seed presents an undeveloped condition with often just the seed coat present. About 75 per cent. of this year's crop has had no visible seed. The Oahu is valuable as a large, fine appearing fruit of good quality. Its nearly seedless condition makes a thin husk with a large proportion of flesh. No mango weevil (*Cryptorhynchus mangiferae*) has been found within these mangoes, and it will be interesting to note what may be the result of the attack of this insect on a fruit which contains no seed upon which its larva may feed. The Oahu is also worthy of propagation as a basis for breeding toward complete seedlessness. The form is oblong, heavily shouldered at the cavity end and tapering toword the apical end; size large, averaging in weight from 10 to 15 oz; cavity shallow, flaring, irregular; stem slender; apex variable, ranging from a point to a depression; surface moderately smooth and undulating; colour pale-yellow with a reddish blush on the exposed side; dots numerous, small, yellow, depressed; bloom bluish-white, moderately abundant; skin moderately thick, tough, tenacious; flesh thick, bright-yellow, juicy, with an abundance of fibre; seed dried up or represented by just the seed coat; flavour rich, moderately sweet, quality good. Season June to August at Honolulu, Hawaii. This tree is of the average height and presents a broad, spreading habit.

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MANAGEMENT OF PLANTATIONS IN UGANDA.

MANY MORE PLANTERS WANTED.

To the Editor, *The Field*, Oct. 19.)

Sir,—The old question is always repeating itself—what to do with our sons? Most of the professions are so choked that any opportunity of obtaining lucrative posts is remote. There is one branch which, to my mind, always appears neglected, and that is the management of plantations. We here in Uganda are at our wits' end to find suitable managers. We are planting out very large areas of land under coffee, rubber, cocoa, and perhaps tea. The country is healthy as a whole. Naturally one gets fever sometimes, but there is no need to be afraid, as, providing ordinary care is taken, very little sickness need be suffered.

True, we are able to get men of a sort here, but the material is very unsuitable, being mostly drawn from the uneducated classes in our sister and other colonies. What we want is the public schoolboy with his higher education. Of course, he must not expect an appointment as manager, or even assistant manager, as soon as he gets out. The new-comer is of no use for at least six months, as he knows nothing of the country, its language, or the management of natives. It will take him from eighteen months to two years to become really competent to act as assistant manager of a plantation. He should have a rudimentary knowledge of engineering, horticulture, and agriculture, and also a speaking acquaintanceship with chemistry. Naturally a great deal can be done by reading, but practical knowledge is what is wanted. We have had too much experience of so-called experts—experts in everything but their special subject.

Well, after the pupil has passed through his apprenticeship of two years (in my opinion this period is not at all too long), he will be able to take up the position of assistant manager with a salary of not less than £350 per annum, with house, fuel, &c. After, say, another two years (of course, according to circumstances) he will probably find himself in the position of manager, with a salary of at least £500 per annum, rising according to the size of the estate to £1,000 and over, with possibly a percentage of the profits of the estate. Estate managers at present receive £600 and upwards.

These prospects, combined with the social life in Uganda and the opportunities of big game shooting during the local leave month is granted, render the life most attractive. Beside estate management, there will be many opportunities for estate surveyors and engineers—mechanical, electrical and irrigation—who will all find good openings at remunerative salaries. I would estimate the number of estates at present being opened at more than fifty, of which number at least forty will require managers within the next two years. I myself have eight estates of my own, beside ten which I am developing for other people—friends, &c.

THE WATER LILY OF BRAZIL.

VICTORIA REGIA ON THE AMAZON.

The famous water lily *Victoria regia*, which is now grown at Kew, Chatsworth, and elsewhere in England, has only been known to botanists for a little over 100 years. Originally discovered by Haenke in 1801, no specimens were seen in Europe until 1828, when some were sent to Paris by D'Orbigny, who had found the plant in the River Parana in Guiana. There it was known to the Indians by the name of *irupe*, a word signifying a dish, in allusion to the shape of the leaves. In 1832 the lily was discovered in the Amazon, but it was not until Sir Robert Schomburgk found the plant on the Berbice River in British Guiana in 1837 that it became known generally to Europeans. Though the plant is familiar to those who know the Botanical Gardens at Kew, it is interesting to note that it is by no means easily accessible in its native lands. This fact induced the writer to undertake a small botanical excursion in search of the plant at the junction of the Rivers Amazon and Negro in Brazil where, amongst other places, it is to be found.

The waters of the Rio Negro had fallen some 10 ft., the stems of the submerged palms were reappearing from the inky waters which had covered them for the past two months, and every circumstance seemed to favour the idea that a good opportunity had arrived for endeavouring to reach the pool where these famous water lilies flourished.

Manaos lies a few miles above the junction of the Amazon and Rio Negro, and although it was said that in the lakes lying in the swampy ground, intersected by natural canals between the two great rivers, these lilies grew, yet it was only with the greatest difficulty that any precise information could be got about them. The rise and fall of the Rio Negro is about 60 ft., and only at certain heights of the water can the lake between this river and the Amazon be reached.

JOURNEY UP THE RIVER.

Early in the morning the steam launch I had borrowed came round. The surface of the still backwater was covered with thick white mist, curling slowly round the palms and rolling past the steep sides of the bank opposite. Soon, however, the intense heat of the sun dispersed the cool mist wreaths, and a mile or two down the stream everything was as clear as could be. Steaming quickly down with the current, the meeting of the black waters of the Rio Negro and the milky waters of the Amazon could be seen ahead, a very clear line marking the junction of the two rivers. Leaving behind the rose-red precipitous banks of the Rio Negro, the launch turned and steamed up the low wooded reaches of the Amazon. The scenery was curiously English: groups of round-headed trees rose from what looked like meadow lands, palms and the thick tropical tangle of brushwood being quite absent. A cry was raised of "Jacaré, jacaré!"—"Crocodile, crocodile!"—and a little way in front was seen what seemed like one swimming rapidly along. It did not dive as we swung round and stopped the engines, and it turned out to be a huge chameleon swimming across the river and very tired by its long journey. With difficulty willing knives and revolvers were stayed, an arm stretched out, and, to the mingled horror and admiration of the crew, the chameleon grasped it and was safely brought on board, where it was secured by cleverly tied noose. This animal is now thriving in the reptile house of the Zoological Gardens.

Steaming along between islands, the launch turned up a natural canal, which soon narrowed so much as to make navigation a difficulty. The forest thickened; monkeys could be heard chattering overhead; white egrets rose and flapped slowly away, and numbers of metallic-plumaged birds flew ahead for a few yards until again put up by our approach. Both banks of the passage were covered with a bright green grass growing in the water, so that much care had to be exercised to prevent the propeller getting hopelessly entangled. An enormous crocodile was basking on the water in front, but the thud-thud of our approach awoke him, and he swam into the floating tangle of weeds and grass. The waterway wound and turned; here and there orchids could be seen on the tree trunks, and now and again a brilliant creeper had flung its purple flowers over a forest tree, but the general impression was one of gloom.

LAKE JANUARI.

A mile or so further on we came out on to Lake Januari, which, according to Agassiz, contains more varieties of fish than all the rivers and lakes of Europe. On its banks are some settlements of *Caboclos*, the houses here being built above high-water mark, and some clearings for the cultivation of mandioca and sugarcane. The people were pleased to see us, and showed us the great iron pans used in preparing their farinha, the staple food of these parts, and their little enclosures of orange and coffee bushes. Roses were growing in pots and amaryllis was in flower near the houses, but the people evidently were very poor. Piles of

turtle shells were lying about, all with the mark where they had been hit with an arrow, and I was told that occasionally pacas, deer, and cutias were shot. Even here there was a vagueness as to the whereabouts of the water lilies, but a boy was found who said he knew the place well, as he had been there to gather the leaves to be made into medicine for consumption.

We got into a canoe and were soon gliding rapidly up a little outlet from the lake. The stream flowed very rapidly; numbers of birds rose quite close to us, as our progress was very silent among the half-submerged tree trunks.

THE LILY'S HAUNTS.

The stream widened; in front of us floated six or seven plants of the lily we had come to see. The great leaves lay on the water in groups, each one, with its edges turned up, looking like circular trays. The colour was a vivid green, shading through red to brown. Among them an object a foot long and five inches or so across, covered with spines like some immense horse-chestnut pod, caught the eye, and only after close inspection did one realise that it was a tightly rolled up leaf. The entire under-surface of the leaves and the whole length of the stalk were thickly covered with thorns, a very necessary protection against the many denizens of the river, who would like to make a meal of the succulent plant.

Water birds evidently walked on the floating leaves, as shown by the footmarks on some of them. The plants grew a few yards apart with clear water between them, and the effect one had expected from books, of the vast stretches of huge green leaves entirely covering the surface of the water, was absent. One group had two flowers open, their creamy rose petals, some 15in. across, emitting a faint odour, and, while handsome enough, not perhaps quite as beautiful as one would be led to expect from the magnificent appearance of the leaves. We tried to obtain some roots to plant in a backwater near Manaos, but all our efforts proved futile. The stalks were terribly thorny, besides being slippery, so that a firm hold was well-nigh impossible, and on throwing down grappling irons the long juicy stems always snapped. At the period when the Amazon reached its lowest these plants would be obviously nearly uncovered, and the seed pods would be exposed all day to the fierce rays of the sun to ripen their seeds, but at that time the waterways, difficult enough to traverse now, would be impassable even for a canoe, as many fallen tree trunks and creepers would hinder the way.

Regretfully we abandoned our attempt to obtain some plants, and returned to Manaos with some fine leaves, flowers, and several of the spine-clad unopened leaves, which proved to be objects of great curiosity to the many Brazilian visitors who came to see them.—London *Times*, Sept. 24.

THINNING OUT HEVEA ESTATES.

CONCLUSIONS ARRIVED AT.

We have, during the last few issues, given our views on the subject of thinning out Hevea estates in the Middle East, and we have supplemented our statements with the opinions of prominent planters throughout the East. We have solicited the views of Messrs C E Welldon, Joseph Frazer, E G Windle, H M Alleyn, and J H Wynell Mayow, well-known in connection with Ceylon and Indian plantations; the views of planters in Malaya—Messrs R W Harrison, Victor Kinloch, D Douglas, and T Wilson—have also been inserted; the views of Sumatran planters have been expressed by Mr J C Tate, and of other areas by Directors such as M Sidney Parry, A Bethune, R C Wright, A R Wilson-Wood, Norman H Grieve, W F de Bois Maclaren, P J Burgess, and Sir William Hood-Treacher, all gentlemen connected with plantation work in many parts of the East. The main points which we set out to settle were; the number of trees which should be aimed at as the minimum, whether thinning out should be done by cutting out alternate rows or careful selection, and whether or not the trees to be removed should have their stems drastically tapped prior to their removal.

NUMBER OF TREES PER ACRE.

On the number of trees per acre we find that the Ceylon section prefer to have the largest number of trees per acre. Mr Joseph Frazer prefers a planting distance of 20 by 10 feet over considerable area, and believes in reducing the number of trees later on to about 150 per acre. Mr Mayow thinks the trees should be reduced to 100, Mr Alleyn 100 to 120, and Mr C E Welldon 120 trees per acre. Mr Windle in this section aims at an average number of 50 permanent trees per acre, his experience mainly being in South India. When we come to Malaya we find that there is a general consensus of opinion that the number of permanent trees per acre should be 90 to 100, but, as Mr Harrison points out, it is sometimes not deemed advisable to thin out to less than 115 to 120 in view of the inevitable loss which results from storms and diseases. It is suggested in many cases that the estates might on good soils be thinned down to about 70 trees per acre. 20 by 20 feet appears to be favoured as the distance for Malaya and Sumatra by the gentlemen who contributed their views to these columns.

We do not, therefore, think that on the advice of the men we have named that one can go far wrong in planting 20 by 20 feet apart on good

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soils where no intercrops are being cultivated; where intercrops are to be cultivated it is our view that the rubber trees should be at a much wider distance, say about 30 by 20 feet or 30 by 25 feet apart.

HOW TO THIN OUT ESTATES.

On the subject of the method of reducing the number of trees per acre, we find there is some little difference of opinion. Mr. Joseph Fraser believes highly in the value of manure, and another correspondent, whose name we cannot unfortunately decipher, is not convinced as to the necessity of thinning-out trees at all unless and until the effect of judicious quantities of manure has been determined. The view expressed in our leader on this subject, which was to the effect that on uneven plantations we would only thin-out the bad and weak trees, and on very even estates cut out every alternate row seems to be held by most of the contributors on this subject. In thinning-out by the careful method of selection, it is suggested that the backward trees, those with large burrs, or those which have been badly tapped, should be selected for removal. Careful selection should be taken to uproot those which appear to have the shortest life before them. A point is made of the desirability in this operation of as far as possible selecting the permanent trees first rather than the weakest in order that the former may be retained and the latter destroyed on a regular system.

TREATMENT OF TREES SELECTED FOR REMOVAL.

On this point as to whether the trees selected for removal should be at once uprooted and destroyed, or the stumps be tapped for a year or so, there appears to be a greater divergence of opinion than on the other points already mentioned. Mr Joseph Frazer would entirely remove the trees selected for removal without getting the rubber from the stems. Mr Victor Kinloch, of Jeram Estate, is also of the opinion that the whole tree should be removed, and not merely pollarded. Mr Burgess is of the same opinion, because he thinks that the delay in the process of tapping may prove serious, and the work introduces a secondary consideration which might be used as a loop-hole by inferior managers. Others state that their view would largely depend upon the financial position of the company, though all admit that the immediate removal of the trees would give the permanent specimens every chance. On this point it is as woll to bear in mind that when trees are removed there is not an immediate response in the form of an increased yield of latex from the remaining plants. From my experience I would not anticipate an increased yield from the permanent trees until quite twelve months had elapsed after the thinning-out process had been completed. Most of the authorities we have quoted appear to be of the opinion that it would be better to stump the trees to about eight or ten feet and tap the stumps drastically for nine months or longer, and then uproot them. This view appears to be held by Messrs. Douglas, R C Wright, M Sidney Parry, Sir William Hood-Treacher. J H Wynell Mayow, and others with whom we have not conferred.

This discussion has brought to light some rather pronounced views against retaining the tappable stumps and in favour of their entire removal, some individuals being of the opinion that they do not think there is a very great advantage in the method, and others pointing out that though the trees may be pollarded, the roots are still alive and in the soil.

Synoptically, therefore, we think we are representing the average view when we say, (1) that about 100 trees should be aimed at permanently in average soil, a lower number in good soil, and a higher number in poor soil; (2) that thinning-out should be done by the removal of backward or weak trees, and not by cutting out every alternate row; (3) where money is badly needed, rubber should be extracted from the stumps before the bad trees are removed. —*India Rubber Journal*, Oct. 5.

CULTIVATION OF COCONUTS.

ESTIMATES FOR OPENING UP AN ESTATE.

BASED ON PRACTICAL EXPERIENCE.

Those interested in the cultivation of coconuts will find in the latest issue of the F.M.S. Agricultural Bulletin (for October) an instructive article by Mr L C Brown, Inspector of Coconuts, F.M.S., who gives an estimate for opening up coconut land. Mr Brown has written on this subject before, but he explains now that, owing to several changes that have taken place in the different conditions of labour since his Pamphlet No. 11 on Coconut Cultivation in the Federated Malay States was published, he submits this revised estimate for the guidance of those who may care to interest themselves in the cultivation. He goes on to say:—

I received the original estimate from Mr Munro, Permatang Estate, Banting, an excellent authority on coconut cultivation and I am again indebted to him for further assistance in compiling the revised estimate, as prices of labour have been obtained from him as well as other planters of experience in Kuala Langat and Lower Perak, and these figures I have worked out on a general average. I am aware that where Chinese labour is employed, the expenses of weeding and cultivation are heavier, and some allowance may have to be made for this; but generally speaking, the advantages and disadvantages by which there may be a saving or otherwise on labour in the various districts about counterbalance themselves, and therefore on the total expenditure there should not be much difference in cost.

I consider therefore as a whole the estimate submitted below may be taken as a reliable one, perhaps rather on the liberal side, and easily capable of being worked upon if the management is carried out on sound and economical lines by any experienced manager. At the same time I have not taken into account any unusual expenditure or what may be considered as an extravagant or unnecessary expense.

As regards returns I have raised the price of copra to $8·50 per picul (under the average rate that has been realised during the past three years), which figure I am of opinion in view of future prospects may be taken as a conservative one. On the other hand I have allowed as much as 240 nuts to the picul up to the seventh year, that is to say while the trees are in partial bearing. The reason for so doing is that during this period the nuts are often found to be smaller and contain less meat than at a later stage. However, from the eighth year onwards I have retained the same rate as in my previous estimate, viz., 220 nuts to the picul, as I believe this return can then be reasonably anticipated.

The expenditure on the estate up to the sixth year works out a little under $190 per acre, and after this period the estimate may be considered self-supporting. Of course over a larger area, say from 1,000 to 3,000 acres, the average cost will be materially less. Allowing therefore for any little difference of expense in the various districts it should not cost more than $200 per acre in any locality to bring a coconut plantation into a remunerative condition.

The estimate for opening up and bringing 500 acres is thus given:—

1ST YEAR.

Felling and Clearing $20 per acre	...	$10,000
Draining at $16 per acre	...	8,000
Cost of seed (35,000) seeds at 8 cents each	...	2,800
Fencing at $4 per acre	...	2,000
Lining and Planting at $3 per acre	...	1,500
Coolie Lines	...	1,500
Tools	...	300
Bungalow	...	1,500
Stationery and Postage	...	100
Medical	...	1,500
Premium at $3 per acre	...	1,500
Quit-rent at $1	...	500
Survey fees	...	500
Weeding, 1st 6 months at $1½ per acre per month	...	4,500
Contingencies	...	1,000
Superintendence	...	3,600
Total	...	$40,800

The costs in the second and succeeding years up to the ninth are respectively:—$14,000, $13,675, $11,275, $10,675, $13,575, $14,800, $19,400 and $19,400.

The returns are set down thus:—

6th year 10 nuts per tree=1,000 piculs of copra at $8.50 (240 nuts to picul)	$ 8,500
7th year 30 nuts per tree=3,000 piculs of copra at $8.50 (240 nuts to piculs)	$25,500
8th year 50 nuts per tree=5,650 piculs of copra at $8.50 (220 nuts to picul)	$48,025
9th year 50 nuts per tree=5,650 piculs of copra at $8.50 (220 nuts to picul).	$48,025

—*Straits Times*, Oct. 16.

THE QUESTION OF SOIL FERTILITY.

The term "Soil Fertility" cannot be said to have any definite significance, since it can only be employed to denote a relative condition. For instance, a virgin soil with only a very small proportion of available plant food may, through the activity of bacterial life present in it, be highly nitrified and fertile; and yet it will become useless after a couple of crops have been taken off it. An analysis, to be of value, should indicate the total amount of mineral plant food in the soil rather than the measure of fertility which depends, so to speak, on accidental and variable circumstances, and is obtainable without any great difficulty by artificial means.

The hydrochloric-acid method of soil analysis is useful in this respect, in that while it gives no true indication of immediate fertility, it is a guide to the total reserve of plant food which can be made available through a comparatively long space of time.

The difficulty in ascertaining the immediate fertility of a soil is in discovering the solvent which most nearly approaches the action of plant roots. There is present in most soils a certain proportion of plant food that may be said to be ready for root absorption, but the bulk of it awaits the solvent action of the roots.

Different chemical compounds respond differently to a particular solvent agent, and different agents act differently on a particular chemical compound. This is a common experience in the use of re-agents in the laboratory.

The action of carbonic acid and other solvent substances present in soil water is sufficient to bring about the solution of certain compounds, but not of others. The solutions of the former that are found in the soil will be available to plants, but compounds of the latter type demand the action of what is known as the "acid sap" of the roots.

If the exact composition of this acid sap were ascertainable there would be no difficulty in imitating its action in the laboratory and so discovering the so-called "soluble plant food" in the soil.

There is good reason to believe that the acid sap of plants is not of uniform composition, that is to say that it is not of the same character in the case of all plants; and this fact serves to complicate the work of chemical analysis made with the object of ascertaining the proportion of soluble plant food, or determining the measure of immediate fertility. The action of strong acid such as hydrochloric acid can in no way be compared to the action of plant roots. A proper soil map should not be based on considerations of immediate fertility, since, as already pointed out, many soils may be very fertile for a short time only and then become exhausted. Closely connected with the question of fertility are the mechanical character of soils and the meteorological conditions prevailing in the districts in which they occur; but the element which has the most important bearing on this question is the biological relations that exist in the soil.

These considerations have been forced upon us by a perusal of a valuable paper by Dr. Jensen of the N.S.W. Department of Agricultre. Himself a chemist, the author fearlessly states that though he at one timo expressed a belief that chemical analysis of soils would be of direct value to the agriculturist, subsequent research has convinced him that he was wrong. In certain cases an analysis is of help to the expert, but in the generality of cases instead of being a guide to the person who is in quest of a suitable manure for his crop, it is a delusion leading him to useless expenditure. Many soils which are low in lime and potash are really rich soils, and many others which are apparently rich need manure badly.

Soil analysis by the official method while misleading to the layman has, however, this advantage, that when analytical results are considered carefully in conjunction with such matters as depth of soil, mechanical condition, climate, topography, &c., it aids in judging of the potential fertility of soils. But it is only an aid, and it is very often the case that without it an experienced person is able to pronounce an opinion, after a few minutes' inspection and manipulation of the soil, more definite and correct than that expressed after a complete and tedious chemical analysis.

"TRUTH" ON RUBBER ESTIMATES.

American Consumption: Official Figures.

Most of my readers will remember the animated discussion which took place recently when a firm of Mincing Lane brokers issued an annual statement showing a very large increase in the world's consumption of rubber. I said at the time that I did not like the basis upon which the table had been prepared. The rubber position was so sound that it could hardly be doubted that statistics prepared on lines less open to criticism would have disclosed a more than satisfactory state of affairs. As it was, some obvious errors destroyed the value of the compilation, and gave the "bears" an opportunity of delivering a vigorous anonymous attack. This week, however, I have received from America some material which throws a good deal of light on the rubber position. These figures, fortunately, are official, and any complaints from the bears with regard to them must be addressed to the United States Customs authorities. America, it will be remembered, is the world's best customer for rubber, nearly one-half of the total production finding its way to that country. But American buyers are well organised. Their practice seems to be to stand out of the market altogether at times, and when prices have fallen to sufficiently low level to buy in all the chief markets simultaneously. When America is in a buying mood, not only does she import largely direct from Brazil and the Middle East, but a considerable quantity of rubber consigned to this country, Germany, France and Belgium is reshipped across the Atlantic. In this way more than 13,000 tons reached America from England during the last financial year. Here, however, are the official figures summarised in English tons:—

American Rubber Consumption.

	Year ended June 30	
	1912	1911
Imported from	Tons	Tons
South America	22,151	14,968
Mexico and Central America	1,615	981
Europe	22,429	14,057
Middle East	2,830	2,065
Other countries	176	93
	49,201	32,164
Less Re-exports	2,505	2,352
Total nett Imports	46,696	29,812

As compared with the previous year, it will be seen that American consumption increased by no less than 16,884 tons—say 56 per cent. As according to the estimate issued by Messrs. Figgis, the total output from the mid Eastern plantations for 1911 was 14,000 tons, it may be said that the increased consumption in America alone is practically swallowing the whole plantation output. It is worthy of note, too, that the American official figures for last year of 46,696 tons compares with Mr Lampard's estimate for the current year of 47,500 tons.

Whether the shortage expected by Mr Lampard will eventuate must be left to time to prove, but all figures relating to consumption so far published have strengthened his argument. This year's British figures disclose a consumption for the first eight months of 11,618 tons, against Mr Lampard's estimate for the year of 15,000 tons. For Germany Mr Lampard also allowed 15,000 tons, and the latest available figures show a consumption of 15,404 metric tons in 1911, as against 10,951 tons in 1910—an increase of over 40 per cent. America, Germany, and this country together take four-fifths of the world's supply, and there is, perhaps, no need to inquire what the smaller consumers are doing. The reduction in stocks continues, and the visible supply of Brazilian rubber on October 1 stood at 3,790 tons, as against 7,190 tons for the corresponding period last year. Plantation rubber, it is true, is arriving in increasing quantities, and helps to some extent to make good the deficiency, but it is clear from the figures that the supplies from the mid-East are not fully meeting the increased demand.—*Truth*, Oct. 6.

GROWING RUBBER IN MINDANAO.

Mr J Shaw Hellier, who has spent many years in the Federated Malay States and Burma in the management of rubber estates, has given the *Herald* at Zamboanga, (Southern Philippine Islands,) an instructive interview on the Island of Mindanao as a rubber country. He says:—"In the first place Mindanao is well within the Para rubber zone. The temperature and rainfall are practically ideal. It is out of the track of typhoons. In these four important points it is so similar to the west coast of the Federated Malay States (where most of the rubber is planted) as to be on a par with it. We next come to the land. Now the terms on which land can be leased from the F.M.S. Government are Rs. 2·16 per acre for the first six years, after which the rent is Rs. 4·32 per acre per annum. This is for first-class land. That is, land touched by a rail-road, public highway or navigable river. Here land can be leased from the government for Rs. 0·20 per acre per annum for 25 years, a difference of Rs. 90,000 in 25 years. As to the quality and accessibility

of the land, from the little I have seen I judge there is plenty of land in Mindanao fully equal to the best in the F.M.S. What strikes me particularly is that there is so much land 'get-at-able' here for an undeveloped country, which is, of course, on account of the very long coast line. This is no small item in a virgin country. Often one of the greatest difficulties is that of transportation. When one can combine the advantages of a new country, such as having almost unlimited land to select from, most reasonable land rents etc., with good transportation one is indeed favoured. The next point, and it is an all important one, is that of labour. This is a far more difficult proposition for a stranger to size up with certainty. All that I can say is that, after talking with many employers of labour, nearly all seem satisfied and able to get all they want. It would undoubtedly take longer here to build up a labour force than it would where it is more organised but if well housed and fed, regularly paid and thoroughly looked after, which are essential on all estates, I have little doubt the labour would compare favourably with many other countries. It is difficult to say just what the average price of estate labour now is in the F. M. S., but it is just about one shilling per day for a man. Chinese get more, Indians less. Then there are Malays and Javanese, and the pay is not the same all over the F. M. S. Neither is it the same on all estates in the same State. Now we come to capital. In this respect there can be no doubt that the F. M. S. has every advantage. There you have a past to point to. Actual results go a long way. Capital is rather shy of going into new fields unless some special inducements are offered. Then there has been a body of planters built up there whom the financiers in London know and if one of them reports favourably on a proposition it will go through. Unfortunately the political situation here keeps capital out until a definite policy is defined.

WORLD'S PRODUCTION OF COCOA.

At a moment when we are in the midst of another "Battle of the Cocoas," it is very interesting to compare the statistics of the world's production and consumption of the much-vaunted drink, which, though introduced to Europe in the sixteenth century, was clearly familiar to the Aztecs, whose remains in Southern America still excite our wonder. Let us first glance at the figures for San Thome, for reasons upon which it is unpleasant to dwell :— In 1901 the produce was 16,983 tons, in 1905 25,379 tons, in 1909 30,261 tons, in 1910 36,665 tons, and last year 35,000 tons. The Portuguese Colony stands third on the list of producing countries. Our own Trinidad is in the fifth place with 21,220 tons last year ; the production had been 11,943 tons in 1901, 20,018 in 1905, 23,390 in 1909, and 26,231 tons in 1910. But we have still better reason for congratulation. The Gold Coast is at the head of the list with 40,357 tons last year. This was a big leap from 1910, when the production was 23,112 tons. In 1909 it was 20,534 tons, the export value being put down at £886,571 ; in 1905 5,606 tons, and in 1901 only 997 tons. In short a great industry has been practically created within a decade. The world's production ten years ago was 105,723 tons (2,205 lb.); last year it was 244,545, an increase of 138,822 tons, nearly a third of which must go down to the credit of the Gold Coast.

The figures for the raw cocoa consumption of the world cannot for various reasons be stated with so much detail or certainty as those for the production, but it seems that it has risen by 80,000 tons within six years. In 1905 the imports into the United States were put down at 34,958 tons; last year's consumption is given as 58,968 tons. Germany stands second with 50,855 tons, an advance of 7,000 tons in the year, and an advance of 10,000 tons over 1909 ; her total in 1905 was 29,663 tons. France comes third as a consumer : in 1905 her imports were 21,748 tons, in 1909 23,254 tons, in 1910 25,068 tons, and last year 27,840 tons. The United Kingdom has not been quite so enthusiastic in its appreciation : the imports in 1905 were 21,106 tons, in 1909 24,264 tons, in 1910 24,082 tons, and last year 25,396 tons, an increase of some 700 tons per year for the past six years. Clearly we have a goodly amount of leeway to make up to get into line with the American and German peoples.—*Grocers' Journal*, Oct. 12.

THE LIME JUICE INDUSTRY OF MONTSERRAT.

In the seventies, we see the beginning of the planting of the lime-fruit trees by Messrs. Sturge in Montserrat. Each year the number of plants increased until now the estate of the Montserrat Company already covers over 650 acres, and contains from 140,000 to 200,000 trees, and more than 100,000 gallons of pure lime fruit juice have been imported in one year into England.

No more beautiful sight can be seen than the lime-tree orchards when the trees are laden with their bright fruit, and at the same time the air is pervaded with the luscious fragrance of the blossom.

Truly a scene of health—the sweet scent of the lime blossom is wafted by healthy breezes—the golden fruit is gathered by healthy negro women who are lithe and upright with the constant carrying of baskets on their heads ; then in this isle of invigorating breezes the limes are prepared by the Montserrat Company, the juice is put into large casks—the shore is covered with the casks, line upon line, row upon row, like billows upon the seashore; these casks are ready to be shipped, and to leave the island on a sea that is "all aglow with brilliant sunlight in which the white sails of the coasting boats sparkle like ice." Then on the arrival of the casks in England, the lime-fruit juice is allowed to settle, and afterwards it is clarified and bottled by the sole consignees.

For many years the Navy, our first line of defence, and our Mercantile Marine, suffered severely from scurvy, and on that account the Admiralty decided to supply the service and all British ships with lime juice. The results show the wisdom of their action, both are now practically free from that terrible scourge. Small wonder, then, that Kingsley described lime juice as "that most useful of all sea medicines,"

Then take another arm of defence. When our armies go forth to war the commissariat invariably selects lime juice as the needful beverage. There could be no more striking picture of perfect health in manhood than the C. I. V.'s, when they returned from South Africa —and we are told that lime juice was their drink during an arduous campaign. Therefore it is no exaggeration to say that by its physique shall a nation stand or fall.

It would appear, from a medical and common-sense standpoint, and in comparing the opinion of experts, that it would be difficult, to find a more healthy and satisfactory drink than lime juice.

The demand for lime juice among athletes is now-a-days very considerable. On the cricket field, in the tennis courts alone, it is in frequent use.—*Century*.

MECHANICAL TRACTION IN AGRICULTURE.

Progressive Move at Bombay.

Bombay, Nov. 2.—A Press Note issued by the Bombay Government states : – For some time past the Agricultural Department have been investigating the question of introducing mechanical traction for ploughing and other operations of cultivation. The question is becoming more and more important owing to the growing scarcity of fodder, cattle and labour, besides hand-digging being an insufficient means of cleaning the soil of weeds. The Bajac windlass plough, drawn by bullocks, has now been introduced, and there is a rapidly growing demand for its use, but progress is slow as it works at the rate of one-fourth of an acre per day. In view of the enormous areas of weed-infested lands that require deep ploughing steam traction was absolutely necessary.

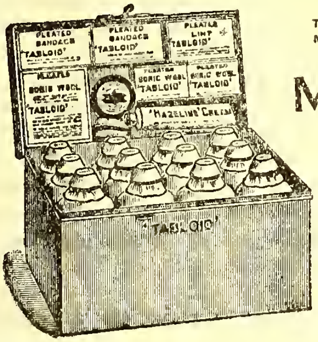
A scheme was accordingly prepared and submitted to the Committee of the Sir Sassoon David Trust Fund who provided funds for obtaining a double engine steam ploughing plant. It is expected that this plant will plough 8 acres per day at a cost R17 per acre, or about half the cost of the Bajac. In sugarcane tracts the introduction of steam plough promises excellent results as the soil requires deep cultivation during the dry season, an operation which under existing conditions puts the cultivator to great expense. —*Madras Times*.

ABOLITION OF JAVA GOVERNMENT COFFEE CULTIVATION.

Amsterdam, Oct. 16.—A Bill has been introduced in the Second Chamber of the States-General for the abolition of the Government's coffee cultivation in Netherlands India. It may be recalled that this was established more than half-a-century ago, and for a long time a vast profit of over fl.20,000,000 annually was obtained from the compulsory cultivation in Java. This was partly spent in the interests of the Colonies, but the biggest part was expended on railway construction, &c., in the Motherland. But gradually the cultivation became less remunerative, and for a long time now it has been abolished in the regions where it was little remunerative. Now it is to be entirely given up, the plantations being, however, sold. The necessary measures are only to be gradually carried out.—*L. & C. Express*.

FRENCH RUBBER INDUSTRY PROTECTION.

The French Government proposes to protect the rubber industry in French West Africa, by prohibiting the manufacture, sale of, and traffic in, coagulated rubber, otherwise than in "sheets" or "cakes" of a maximum thickness of one centimetre. The tapping of rubber trees is also prohibited during not more than three months of each year, the particular period to be decided separately by the Governor of each colony.—*H. & C Mail*, Oct. 18.



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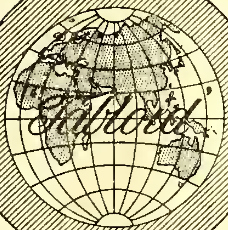

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SOYA BEANS AS A POSSIBLE RIVAL TO COCONUTS.

The vast area planted with "Manchurian beans" in North-Eastern China and the contiguous portion of Siberia may in the future be greater still. A new field for bean oil has been found and the new factories in Mukden and Dalny are now turning out very large amounts of both laundry and toilet soaps. It is understood that the Lever Bros., Ltd., of Port Sunlight, England, will also establish a monster soap factory at Kobe; the only drawback thus far is the lack of alkali in Japan and Northern China. According to the Bureau of Manufactures of the United States Department of Commerce and Labour, the United States uses considerably over ₱5,000,000 worth of bean oil annually.

Soya oil affects the price of copra. Soya soap relieves the over-production tendency of bean oil and thus becomes a long distance enemy of the Philippine coconut, although it directly assists in a degree in keeping up the price of soya oil.

The Soya has also found a new field in what will probably be one of the best agricultural regions for the culture of that famous legume in the whole world. Instead of flax, which has heretofore been grown for linseed in rotation with wheat and maize, the soya will now be used in Argentina both for its own oil and as a soil restorer, thus increasing the fertility of the fields.

While the percentage of oil in ordinary soya runs from 16 to 20 per cent, some of the new varieties which will be planted in the alluvial plains of the Plate River will contain up to 23 per cent.—*Philippine Agricultural Review.*

THE SAGO PALM.

British North Borneo exports some Pesos 120,000 worth of sago annually, says the *Philippine Agricultural Review*. The Agusan valley of Mindanao could undoubtedly export several times this amount from the vast swamps filled with the same species of sago palm which extend across the Sulu Archipelago into Borneo, and eastward to New Guinea. There is no doubt that some day these swamps will be the scene of great activity in the way of starch, sugar, and alcohol manufacture. Sago flour, when properly prepared, is an excellent food, and by fermenting, alcohol can, of course, be made. Fortunately, the sago palm produces itself from suckers as soon as the old plant is felled; but unfortunately

perhaps for the palm-sugar maker, it is a palm which dies at the time of flowering. Properly managed a sago swamp would be continuously productive without replanting or cultivation of any kind; that is the growing palms should be allowed to stand at proper distances and all unnecessary suckers and useless intermediate trunks should be removed, allowing one or two suckers to grow from the base of each trunk as soon as it is ready for cutting. In fact, the sago may some day rival the nipa as a profitable palm crop, though it will never compare with the coconut.

RUBBER IN IQUITOS PERU.

H. M. Consul at Iquitos (Mr G B Michell) reports that the trade of Iquitos during the first half of 1912 was restricted. The advances to rubber gatherers have been much reduced and credits curtailed. The rubber exports during the six months ended June show an increase of 416 tons over the same period of last year, and, as the second half of the year is the period of greatest exportation, a very good year is expected. Caucho or "Peruvian Ball" has risen in value because it does not meet with much competition from the Far East, but the trees are rapidly disappearing and the caucho is now being brought from great distances, largely from the Madre de Dios region, though the difficulty of transport makes the supply from this district very irregular.—*The Board of Trade Journal*, Oct. 17.

COOLIES AND THEIR DIET.

Importance of Providing Full Meals.

Dr. Sansom, P.C.M.O., Federated Malay States, in his recently issued annual health report for 1911, writes :—

It is very important that the advantage of a generous diet should be carefully considered by all employers of labour. Several years' experience with a very large, constantly changing, labour force has been so convincing that plenty of nourishing food is one of the most important factors in maintaining good health, that I feel compelled to urge everyone who has labourers under his control to pay particular attention to the food supply of coolies. It is most essential to build up and strengthen new arrivals who have very little reserve force to call upon either for work or to resist illness. Individuals removed from their houses and placed under new conditions are always more liable to disease, and regular work is a greater effort and means a large expenditure of energy in the early days. Work in tropical countries involves a greater expenditure of energy than labour in temperate climates—a labourer needs a definite supply of proteids, fats, carbohydrates and salts to enable him to work and provide resistance to disease—unless this is given the output is poor and mortality rates rise, so that not only from the human point of view but also from the business aspect it is necessary that this supply is adequate. Expenditure on prevention of illness is soon repaid with large interest; stupid ignorance or wilful neglect of this important duty means unnecessary wasteful extravagance as well as loss of life.—*Malay Mail*.

GROWING OF EUCALYPTUS IN SIMLA.

During the past two years a series of interesting experiments have been undertaken by the Forest Department in the Simla Hills, for the purpose of testing the possibility of introducing eucalyptus on a large scale. The experiments were carried out mainly at the different stations of the Kalka-Simla Railway, in the Simla Municipal forests, and the catchment area, the elevation thus varying from 2,143 feet at Kalka to 7,400 feet at the catchment area. It was hoped that it would be possible by the end of this year to decide whether eucalyptus can be introduced into the Simla Hills on a large scale. The experiments, however, have not been altogether decisive. Certain species were found to grow quite well by direct sowings at all elevations from 2,000 feet to 5,000 feet, some shading being necessary in the first hot weather. Above 5,000 feet, however, the results were not so successful, no species having yet been found that will stand frost. The experiments are to be continued, therefore, for a few months longer, and will include a test at the higher elevations of a small quantity of Norfolk seed that has been received from Mr Booth-Tucker, of a species which is said to stand severe winters.—*Indian Engineering*, Nov. 9.

MONAZITE IN TRAVANCORE.

Nagercoil, Oct. 29.—Mr C W Soomburg, Travancore Agent Cosmopolitan Mining Company, has just exported 1,600 bags of monazite, weighing 100 tons, to Hamburg. This rare mineral, of considerable commercial importance, exists in immense quantities in Travancore, and it is collected and exported by the said company, which discovered it in a big tope on an extensive scale. The mineral is found on the bed of an adjoining stream and is supposed to have been brought down and silted up by it.—*Statesman*.

STERILISATION OF MANURES.

OPINIONS OF LEADING FIRMS IN COLOMBO.

Interesting Views.

The Dimbula P.A. Resolution with regard to the desirability of sterilising manures imported into Ceylon, which was referred to the Agricultural Department at the Ceylon Planters' Committee meeting last Friday, has aroused a good deal of discussion. Our representative interviewed three of the leading manure firms in the island on the proposal; generally the idea seemed to be that it would be an exceedingly difficult matter to do more than what was being done.

THE COMMERCIAL CO.'S VIEW.

Mr M J CARY, Acting Manager for the Colombo Commercial Company, was decisive, when shown the paragraph in question. "Absolutely impracticable" was his first verdict. The matter, he says, has come up periodically, but was an impracticable one to deal with. Most manures, like basic slag and phosphates, are practically sterilised in themselves. The resolution could only apply to manures like fish and ground cake, etc. "And what," he asked, "would be the good of sterilising these? You may sterilise them, but unless you are going to seal them hermetically they will have lost their value by the time they got to the estate even. Take a glass of water, for instance; you may sterilise that, but if you leave it in the glass open on this desk in a very short time it will be no longer sterilised." Mr Cary also pointed out the difficulty of plant, and general supervision.

A CHEMIST'S OPINION.

Mr P A KEILLER—analytical chemist to the Colombo Commercial Company—said he believed the scheme was an impracticable one. The complaint he thought arose through the presence of weeds in the manure, and this was a thing they naturally tried to avert. Seeds could only be contained in poonac and similar manures, where the matter had not been sufficiently screened, but his firm had had complaints of seeds in slag manure, which of course was impossible. The only remedy as far as he could see was for the matter to be thoroughly screened before it came over to Ceylon. Much of the weeds complained of might be traced to weeds by the roadside, which under certain conditions would seed, and the seeds be carried into the tea. Mr Keiller added that the complaint was one that cropped up every now and again. He agreed that plant would be most expensive, and that it was almost impossible to deal with sterilisation, though they always tried to keep their manures as pure as possible.

ANOTHER EXPRESSION OF OPINION.

Mr. T E WAGNER, Manager for Mr A Baur, asked if he had seen the paragraph, said :—

"Yes, I have read the small paragraph of the Ceylon Planters' Association on the subject of the sterilisation of the manures imported into Ceylon. I can ascribe no reason for suggesting the advisability of insisting on any special sterilisation of manures imported into Ceylon, and consider that the proposition was perhaps made without proper knowledge of the manufacture of fertilisers in Ceylon. As the largest Manure Works in the island my firm has naturally adopted the most up-to-date processes for the manufacture of fertilising substances.

All the fertilisers are manufactured out of very clean manurial ingredients which a rapid glance over my Price List will show. There are the oil cakes such as Castor Cake, Rape Cake and Groundnut Cake. These are obtained through the extraction of oil from Castor and Rape seed, and groundnut kernels respectively.

The sterilisation of organic substances which could be carriers of germs are, you will be glad to hear, carried out either at the places of manufacture outside of Ceylon or in Ceylon itself. Fish Guano for instance is a manure obtained by the extraction of oil from freshly caught sardines. As this extraction is carried out by steam or boiling water, the product, which is a valuable manure, is, of course, absolutely sterilised and as the guano is dry no subsequent decomposition can occur. Large quantities of Fish Manure are imported into Ceylon. Fish manure is manufactured from freshly caught sardines which are spread on the beach and dried in the sun. This product is, therefore, absolutely clean and in my opinion just as harmless as the dried fish which is imported from India and the Maldives into Ceylon in large quantities for human consumption.

Then there is Blood Meal, a manure especially valuable for tropical plantations owing to the fact that it nitrifies rapidly in soils poor in lime such as Ceylon soils unfortunately are. I import all this Blood Meal from England and Australia, where the manufacture is carried under Government supervision, and the product is received here in an absolutely sterilised condition.

ABSOLUTELY STERILE.

There is another organic article which is greatly used in Ceylon and this is Bone Meal,

At the Ceylon Manure Works, Kelaniya, the steamed bones are treated by super-heated steam in large cylinders, in order to break up their texture, and to sterilise the product. The bones after being treated by steam are dried in a special Drying Apparatus and are then crushed into a fine powder which is absolutely sterile.

Many other manures, such as some Potash salts, on account of the chlorine they contain, and Basic Slag by reason of its large percentage of free lime, are very good disinfectants.

The manufacture of fertilisers in Ceylon is done with due observation of modern sanitary views, in fact, I think that the Ceylon Manure Works at Kelaniya and those of my competitors are quite above the standard of manure works found in Europe and other countries.

It might interest you to know that a few years ago I went to the expense of getting a report from Professor Aldo Castellani, Director of the Bacteriological Institute, who went over the whole works and drew samples of various manures which on examination were shown to contain no pathogenic bacteria whatsoever.

Due to Want of Knowledge.

You will see, therefore, that any suggestion regarding the imposition of special regulations for the sterilization of manures must have emanated from want of special knowledge of the subject. There are only very important and large firms dealing in manures in Ceylon who are quite alive to the fact that manufacture of their products under sanitary conditions is absolutely essential, and your readers may rest assured that all the necessary precautions are taken. I think, however, that it is the planter who should be very particular with regard to the storage of manure mixtures. There is, of course, no doubt that manures, or for that matter any other organic substances, will become noxious if exposed to rain.

Difficulties in the Way.

Mr. S. Freudenberg smiled as he read the paragraph and forthwith plied the pressman with a host of questions. "How do they propose to do it? It will mean an enormous plant. We ourselves deal with some thirty thousand tons every year. How do they propose to deal with the thousand native dealers who import from India?—and what do they intend to do with the manure that comes from Australia, Japan, Europe, all over the world? It is a very tall order, and I think it is best left alone. If one man is compelled to sterilise his manure all the others must, and there will be many difficulties in the way."

"BULLETIN OF THE IMPERIAL INSTITUTE."

"The third Quarterly issue of the "Bulletin of the Imperial Institute" Vol X. (1912) No. 3, contains Reports of recent investigations by the Scientific and Technical Staff; the first (on Uganda) of a series of special articles to be contributed by experts, describing the developments—chiefly agricultural—that are taking place in the Colonies, particularly in the Crown Colonies and Protectorates; and several special Reports. A section of the Bulletin, dealing with *Recent Progress in Agriculture* and the development of Natural Resources, gives a summary of all important new developments in agriculture and planting during the previous quarter. A note on *Seaweed as a Manure* points to a new source of potash salts in the large seaweeds of the Pacific growing within the three-mile limit of the American coastlands, which could be made to yield annually about eight million tons of potassium chloride. Reports are published on

Rubber from Ceylon,

the Gold Coast, North-Western Rhodesia, Papua and British New Guinea. Two new rubber-yielding plants from Papua, about which very little is known, are described and analysed.

The leading article is on *The Improvement of Cotton in India*, reports on which show what is being done to remedy the defect of short-staple cotton grown in India; and detailed descriptions are given of the results of examination in the Institute laboratories of improved cottons.

EASTERN RUBBER IN U.S.A.

Conclusion of Mr. Baxendale's Exhibition Report to the F.M.S. Planters.

I am convinced that Mr Staines Manders, and those associated with him in organising this, the Third International Exhibition, have done a genuine service to the plantation industry, whereby we have been enabled to place our produce so prominently before our best customers. At the same time, the benefit is likely to be of only a temporary character unless we make up our minds to adopt some of the suggestions made to us by manufacturers. The lack of uniformity (the most serious charge) is ascribed to the use of harmful acids in coagulation, and (or) to the mixing of all kinds of rubber by dealers while it is passing through their hands in Europe

To avoid the former cause of complaint, the greatest care must be taken to keep the use of artificial coagulants to the lowest possible limit—if it cannot be eliminated altogether. Half-a-dozen different specimens of acid (including nitric and sulphuric) were exhibited in the Malayan Court and stated to be used for coagulation. Several manufacturers expressed their regret that such things, should be used on estates, although it only confirmed the impressions they had already formed. They admitted that they had detected no trace of acid in "plantation" when tested at their factories, but did not accept this as proof that no damage had been done. The general opinion appears to be that acetic acid, if used in very small quantities, is harmless, but no other coagulant should be used in the bulk until it is *proved* harmless in the samples.

It is also very desirable to prevent the mixing of rubber in transit. Both the importers and the manufacturers of America are in a mood to support our efforts, but they are helpless so long as we continue to ship unbranded rubber. At my request, Messrs. Bridge & Co, of Manchester, are now experimenting with a view to producing a hand stamp to perforate crepe as well as sheet. I look forward to the time when every Manager in Malaya who takes pride in his curing will stamp every piece of rubber produced, and I am confident that those who are not prepared to take this simple precaution will, before long, find their rubber classed among the mysterious packages which "look like" Hevea sheet or crepe.

This is one step towards protecting the produce of reputable estates. The rest will come when European dealers realise that if they will not tranship our rubber in the original cases, direct shipment from Malaya to New York is inevitable. I must express my appreciation of the kindness I received, in the U.S.A. and Canada, from all the leading representatives of the trade. The freedom with which manufacturers discuss every detail of their business, and accorded their permission to use any information they gave me for this report, is the best evidence that their experience with plantation rubber has been sufficiently satisfactory to encourage their desire to improve the acquaintance.—Yours faithfully,

C. BAXENDALE.

24, Coleman St., London, E.C., Oct. 24, 1912.

—*Rubber World*, Oct. 31.

RUBBER CULTIVATION IN PANAMA.

FAILURE OF AN EXPERIMENT.

Panama, Oct. 8.—After six years of experimentation in cultivating the Panama rubber the Boston-Panama Company has abandoned that part of its plantation enterprise. The company has a tract of between 800 and 1,000 square miles on the east side of Montijo Bay. Seven years ago it began the work of clearing, and incidentally it gathered each year many thousands of dollars' worth of wild rubber. The tree (*Castilloa elasticus Panamensis*) grew so well in its wild state that the early efforts on the plantation were devoted entirely to rubber. About 200,000 trees were set out, and expert attention was given them. They have been yielding each year a quantity of rubber, but they do not yield so well as the wild tree, and there is no profit, at present prices, in the cultivation. The company has turned its attention to other crops, such as coconuts, sugar, and general produce. This, the largest of the isthmian plantation companies, has no stock for sale. Its owners have invested in the land ; they have employed a staff of experts and conducted experiments in the same manner as the United Fruit Company would, and for the same purpose, namely, with a view to making a profit, at the end of a long term of years. Only enterprises of this character will succeed in Panama. The result of this careful experiment with the wild rubber tree is valuable, as it may prevent others with smaller capital from wasting their resources on rubber insted of investing in such crops as will pay quickly and well. Coconut trees require only five years for the first crop, and they need little attention after they are matured. Other crops, such as sugar, garden vegetables, and pineapples, are sure producers, and the local market is already good and will expand greatly as soon as the canal opens.—London *Times*.

ON GREEN TEA.

HOW TO MAKE IT.

We are a tea-drinking nation—more now than ever. We are leading the nations of the Continent to be tea-drinking, too. You can get a cup of tea almost anywhere abroad ; and in Spain perhaps the worst cup of tea in the world.

Report having come from Russia that the demand for green tea is increasing to an extraordinary extent there—nearly twenty times as much being imported last year as in 1904—a "Daily Graphic" representative made enquiries as to how England stood in this respect. He referred the question to a well-known firm of tea brokers

in Rood-lane, Messrs Walker, Lambe and Co. 'The consumption of green tea in this country," they replied, 'is infinitesimal. The principal consumption is in Morocco, where it is the universal drink of all classes. In Portugal and Persia also there is a market for the finest green tea, and there is an enormous consumption of it in Canada and the United States.'

It is not easy to find an everyday consumer of green tea. The "Daily Graphic" representative found one. 'If you once acquire the taste for green tea,' said this connoisseur, 'and know how to drink it, it's awfully nice."

'How do you drink it?'

'As the Moors do. They take it with all their meals. Put, say, six leaves of mint and six lumps of sugar in the pot with the tea, and brew all together. They sometimes use lemon-scented verbena leaves instead of mint. The taste is brisk and pungent. The Moors drink it so largely because their food is farinaceous, and the tea acts as a sort of corrective. They drink it in glasses and without milk. It is better without milk.'

Jewish houses in London are the principal exporters of green tea to Morocco. It is a sort of barter, and money seldom passes. Green tea, soap and candles, go out in enormous quantities, as well as Manchester shirtings and cotton goods. The Moors in return ship to the Jewish dealers in London goat-skins, gums of all kinds, millions of eggs in the season, and quantities of canary, cumin, fenugreek, and other seeds. Sometimes the green tea is transhipped at Marseilles. The bulk of it comes from China to London, however, and is transhipped here. London, therefore, does a large business in green tea, though the home consumption is small.

Many people are more susceptible to green tea than to coffee as a stimulant. English 'Varsity graduates drink it when they are cramming for exams; just as the Russian increase is due to the Mahomedans of Central Asia drinking it because it is a stimulant, and their religion forbids the use of intoxicants. Among the English upper classes there is a small but steady demand for green tea. A West End manager explained that if a man is accustomed to going to big dinner parties and drinking many wines he wants something the next morning that will strike his palate at once. He is more satisfied with a cup of green tea on this account, because of its distinct flavour. "It is a very poor liquor," added the manager, "of the colour of brandy. The green teas we sell are commonly for use in conjunction with black teas. We may have a customer who likes Ceylon tea with a flavouring of scented orange pekoes—say 2 oz. of the latter to 14 oz. of Ceylon. Some people would say 2 oz. of green tea is too much. By itself green tea is unpleasant. It has a sort of herb flavour and is an acquired taste. After several weeks, perhaps, you begin to like it."

Green tea is dear this season, partly because America is paying such high prices for it. Last year the United States came to a curious decision not to admit green tea if "faced" (or artificially coloured.) On a London retailer's price list it is quoted thus:—Fine gunpowder, 3s 1d to 4s 1d; fine to finest hyson, 3s 5d to 4s 9d; hyson, 3s 1d.

As to other fashions in tea it may be noted that China tea, although its consumption is small compared with the others, is profiting as a result of the doctors "booming" it as having no tannin and being better for dyspepsia.—*Grocers' Journal.*

ALGERIAN VEGETABLE FIBRE.

Vegetable fibre, or *crin végétal*, is made from the leaves of a dwarf palm which clings to the soil tenaciously. Its presence was a serious obstacle to the pioneers of Algerian colonisation, and it had to be fought foot by foot. It was not then known that the plant would become a source of wealth to the colony, and that it would be more and more sought after as a commercial product. The palm grows abundantly in Algeria in sandy soil, among rocky mountains, as well as in rich, deep soil. Heat cold, rain and drought do not harm it. After several attempts had been made to utilise the palm, satisfactory results were obtained in 1847. The leaves were separated by a comb into long and flexible filaments, which were twisted into rope shape. The palm leaves are plucked by the Arabs only when they have nothing else to do, the work being poorly paid. In years of drought it is their only resource. Treated on the spot, simply and economically, and slightly dried, the leaves are sold by local manufacturers to export firms on the sea coast, where, after a few days' exposure to the sun, they are made up into bales. *Crin végétal* serves well for stuffing furniture and mattresses, and it can be used for cleaning and polishing floors, wood, and brass work. Its use for domestic and other purposes is causing increased sale, re placing many other more expensive articles. The most important customers for Algerian *crin végétal* are the United States, Italy, Germany, Austria, Belgium and France.—*Royal Society of Arts Journal*, September 27.

MANUFACTURING BANANA FOOD PRODUCTS IN JAMAICA.

Considerable attention was aroused by reports published during 1911 of the development of the banana food product industry in Jamaica, West Indies. A year ago there was but one factory manufacturing the so-called "banana figs" of export while now there are six factories in active operation with another in course of construction and two more companies have recently been formed for the same purpose. United States Consul J D Dreher of Port Antonio, Jamaica, has the following to say about this new industry which we reprint from the "Consular and Trade Reports."

The original factory, which has been operating about six years at Gayle, claims to have a secret process for making banana figs. A large factory at Montego Bay had its machinery made after its own designs in New York. Two other companies expect to patent their machines which have been locally designed and manufactured. It is understood that the drying is done by hot air and that it takes 400 to 500 pounds of fruit to make 100 pounds of the figs. For a good many years experiments have been made in drying bananas, but it has been difficult to find a process for making a product that would keep well. Now that manufacturers are using a variety of machines and apparatus it is to be expected that the best process will soon be known. Although worms are never found in ripe bananas, the preserved fruit if left exposed attracts insects and soon becomes infested with small worms, as is the case also with other dried fruits.

The food products manufactured are fig bananas or banana figs, cooking bananas, banana chips, flour, and meal. All the factories dry or evaporate the bananas whole without the addition of sugar, and yet they are sweet and palatable, like pressed figs, which they also resemble in colour. At least one factory cuts the bananas into short pieces before drying or evaporating them, thus making a product that looks much like the dried figs of commerce. It seems that it would be well in order to make a distinction to call the bananas cut into pieces "banana figs" and those treated whole "fig bananas." What are known as "cooking bananas" are so thoroughly dried as to be hard, the colour of these being almost white. Broken into pieces they form "banana chips," which, not meeting with duties, are imported to be ground into meal or flour in the country of consumption. In spite of the fact that the meal is said not to keep well, one Jamaica factory uses an American gristmill for grinding the chips into meal. Another company has its own factory in London, to which it exports the chips to be ground into flour and meal and made into other preparations for market. A small booklet is issued there to set forth the dietetic value of banana foods as attested by British and German food experts and others; and there is added a list of products on sale, with recipes for their use, etc. These banana food products have been awarded many prizes, diplomas, and certificates of merit.

It seemes that all banana food products are wholesome and nutritious. The figs are delicious and are likely to be preferred to real figs by many persons. The fig bananas cut into small pieces may be used like raisins to impart an additional flavour to cakes and puddings. The chips after being well pounded or grounded in a coffee or other hand mill, may be boiled and then used as an excellent breakfast food or for making delicious puddings. Gruel, porridge, and other preparations made from banana flour and meal, which are rich in easily soluble carbohydrates, are recommended for infants, invalids, and dyspeptics. The negro women of Jamaica use banana meal gruel as a substitute for milk for their infant children. The banana itself is one of the most wholesome and nutritious of fruits if eaten slowly when it is perfectly ripe (that is, just before it decays), but not when devoured only half ripe, as is often the case, which causes many persons to regard bananas as being difficult to digest.

It seems only necessary to make the value of banana food products known in order to create a large market for them. Already they are to a considerable extent popular in Germany and Great Britain, which have been taking the bulk of the exports of such products from Jamaica. When bananas are selling at a low price, as is usually the case in this colony during the fall and winter, it is quite profitable to use them for manufacturing purposes. As the world's demand for these products increases it is to be expected that bananas will be grown extensively in districts too remote from shipping ports or railroad facilities to make their exportation practicable. In Jamaica several factories have already been built in such districts. In banana-producing countries far removed from large markets, like the Society and the Samoan Islands and other Island groups in the Pacific Ocean, this fruit could be grown at small expense for manufacturing food products. Especially adapted to such an undertaking is Tahiti, the principal

Island of the Society Group, which has steamship communication with San Francisco and New Zealand and Australia, all too distant for exporting the fruit itself to advantage except in vessels built especially for that purpose. The Hawaiian Islands and the Philippines also seem to offer inviting fields for the profitable manufacture and exportation of banana food products. Owing to the high price paid in Jamaica for bananas for export to the United States from March to July, inclusive, the factories either discontinue operations during those months or use mostly the small unmarketable bunches of fruit for manufacturing purposes. In order to have a continuous supply of fruit several companies are making arrangements to grow bananas for their own use. Owing to the prevailing high price of bananas, one company could not undertake to fill a recent order for 100 tons of chips. Another company, which could not accept orders from importers in the United States last fall because its entire output was under contract for shipment to Europe, is taking steps to enlarge its factory in order that it may be in a position to meet the increasing demand. So far as can be ascertained, the combined capacity of the Jamaica factories is 12 to 15 long tons a week; but the output may be considerably increased by next winter. The big bananas, the chief article produced, are generally packed for export in boxes of 56 pounds each (one-half of a British hundredweight), though some are put up in 1-pound packages. There is no export duty on banana food products. The retail price of the figs in Jamaica is 8 to 12 cents a pound and the export price for figs or chips is about $150 a long ton (2,240 pounds). Samples may be obtained from the factories.—*Suffern's Foreign Trade Journal.*

PLANTING IN COORG.

SPEECH BY MR. R. D. ANSTEAD.

A meeting of the Coorg Planters' Association was held at Mercara on the 14th instant to welcome Mr L G Jonas, the Scientific Assistant for Coorg, who has just arrived in India. In the course of an interesting speech introducing him, the Scientific Officer, Mr R D Anstead, said [after introductory remarks *re* problems to be solved, and coffee manures,]:—

CEARA RUBBER.

In the case of Ceara rubber, Coorg is already in an advanced state of knowledge, and I think that the immediate problems to study are how to increase the yield of the tree and to reduce the cost of production. With regard to the former there are two lines of study which I wish to suggest to you; first the influence of soluble fertilisers like nitrate of soda and sulphate of potash on the increased yield of latex, on which I had the pleasure of doing some preliminary work last year; and secondly the possibility of increasing the yield by selection, thus getting a *jât* of tree which gives a higher yield of rubber than that usually grown now.

TEA EXPERIMENTS.

With regard to other crops I will say nothing now, except that I am delighted to hear that a trial is about to be made with tea. I feel sure that tea would do well in some parts of Coorg, and perhaps I may be allowed here to sound a note of warning. Tea cannot be planted cheaply; the best seed of a suitable *jat* must be obtained, and it must be well planted, and I strongly advise those of you who are contemplating growing this crop to get men with past experience of tea planting to come and start it for you at first. I have seen utter failure as a result of the opposite system in a new District, and I do not want to see that happen in Coorg. I believe it has happened once already. [After handling soil problems and coffee leaf disease, he proceeded:]

THE NEW SCIENTIFIC ASSISTANT.

Gentlemen, it is now my pleasant duty to formally present to you Mr L G Jonas, and to ask you to accord him a welcome. That you will extend to him that kindly hospitality and courtesy which you have always so generously extended to me I feel sure, and that you will get on well together I hope. You will find Mr Jonas full of enthusiasm, and if you take him into your confidence and work in close co-operation with him, I feel quite certain that you will never repent having established a Scientific Department of your own in Coorg. It is impossible for me to speak on this subject without a feeling of deep regret, which I know you share with me, that one of the first promoters of the scheme we see consumated today is no longer with us. It was, as I know, very close to Mr R D Tipping's heart, and he would have rejoiced to see it so rapidly, and I trust successfully, carried out in his own district. In conclusion I wish you, Mr Jonas, and you, gentlemen, the very best of good luck.—*M. Mail*, Nov. 16.